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Semi-Annual Report
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IUE Program ID IGLRD
"The Carbon Abundance in the Super Metal Poor Galaxy GR 8" 3 p

Summary

The main goal of this program is to measure the strength of the C III] $\lambda1909$ emission line in a very metal poor H II region. Subsequent to the submission of the proposal, we found a candidate superior to GR 8 (UGC 4483; brighter and more metal poor) and were granted permission to change the program to the better candidate. Observations were obtained on May 2, 3, and 4 of this year. A preliminary analysis of the data indicates that the log (C/O) ratio is about -0.5, supporting the emerging trend that C/O is roughly constant over a wide range in O/H for metal poor H II regions. In the last year, new results on stellar abundances have given added significance to the study of these metal poor H II regions.
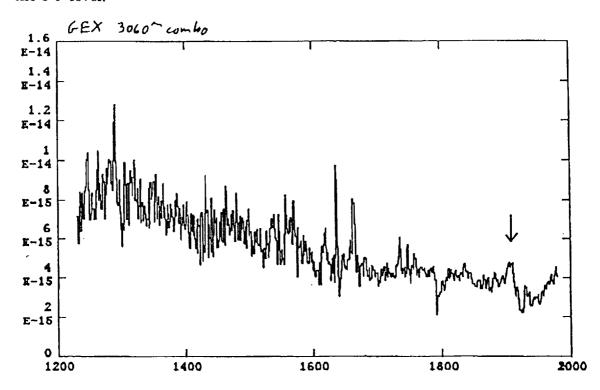
The Observations

After submitting the original proposal to observe an H II region in the very metal poor galaxy GR 8 (Skillman *et al.* 1988), an even better candidate was discovered. This candidate is UGC 4483, a dwarf galaxy in the M81 group (Skillman *et al.* 1991). The candidate H II region in UGC 4483 has an oxygen abundance of about 20% less than that of GR 8, and a higher surface brightness, resulting in about a factor of 2 larger flux in the IUE aperture. The latter quality mitigates the one weakness noted in the peer review, that the project was somewhat risky due to the low flux of GR 8. We were given permission to substitute UGC 4483 for GR 8 for this project.

Observations were acquired during three days. A total of 3060 minutes of integration were achieved in 3 observations. A summary of all of the observations is given below:

IMAGE #	OBJECT ID.	OBJ CLS	D S	A P	TIME MIN:SC	PROG. ID	PROC. DATE	ST ID	NSSDC TAPE	OBSERVER COMMENTS
FES 2301	UGC4483	82	L		160:00	IGLRD	90/123	G		
FES 2302	UGC4483	82	L		020:00	IGLRD	/	G		
FES 2303	UGC4483	82	L		160:00	IGLRD	90/124	G		
FES 2304	UGC4483	82	L		:	IGLRD	90/127	G		
SWP 38719	TFLOOD	99	L	L	000:07	IGLRD	90/123	G		B=139
SWP 38720	NULL	99	L	L	000:00	IGLRD	90/123	G		B=25
SWP 38721	UGC4483	82	L	L	1100:00	IGLRD	90/124	G		E=190,C=185,B=130
SWP 38725	TFLOOD	99	L	L	000:07	IGLRD	90/124	G		B=138
SWP 38726	UGC4483	82	L	L	1080:00	IGLRD	90/127	G		
SWP 38729	UGC4483	82	L	L	880:00	IGLRD	90/127	G		E=147,C=148,B=99

A Preliminary Analysis

The figure below shows the combined spectra. C III] $\lambda 1909$ is evident at about the 3 σ level.

The preliminary C III] $\lambda 1909$ flux is $\approx 1.2 \times 10^{-14}$ ergs cm^{-2} s^{-1}. Correcting for reddening, this yields a $\lambda 1909/\lambda 4861$ ratio of about 0.6. Estimating the C^{++} ionization fraction to be about 80% (from the oxygen ionization fractions) results in a carbon abundance of (very) roughly $12 + \log (C/H) = 6.8$. This preliminary result implys that the C/O ratio in UGC 4483 ($\log C/O \approx -0.5$) is the same as in I Zw 18 (Dufour, Garnett, and Shields 1988; Dufour and Hester 1990). This is a factor of 2 below the C/O ratio in Orion, and is comparable to the C/O ratio in NGC 2363 and the LMC.

Implications of New Stellar Abundance Results

Recently, Abia and Rebolo (1989) have determined oxygen abundances for stars of metallicites in the range $-0.2 \geq$ [Fe/H] ≥ -3.5. Contrary to earlier studies, they find no "plateau" in the O/Fe vs. Fe/H relation at low values of Fe/H. That is, the oxygen "overabundance" continues to increase with decreasing Fe/H. This may mean that metal-poor H II regions such as I Zw 18 and UGC 4483, with [O/H] = -1.7, -1.6 respectively, would have similar oxygen abundances to stars with [Fe/H] $\approx$ -3.5! The validity of the Abia and Rebolo result was supported during discussions this summer at the 31st Herstmonceux conference "Elements and the Cosmos".

References:

Abia, C., and Rebolo, R. 1989, *Ap. J.*, **347**, 186.

Dufour, R.J., Garnett, D.R., and Shields, G.A. 1988, *Ap. J.*, **332**, 752.

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Skillman, E.D., Melnick, J., Terlevich, R., and Moles, M. 1988, *Astr. Ap.*, **196**, 31.

Skillman, E.D., Terlevich, R., Kennicutt, R.C., and Garnett, D.R. 1991, in prep..